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REPLY TO Wilmington Office

October 5, 2007

By Electronic Filing

Chief Judge Gregory M. Sleet
U. S. District Court for the District of Delaware
844 North King Street
Wilmington, DE 19801

**Re: Rohm and Haas Electronic Materials v. Honeywell International Inc.,
Case 1:06-cv-00297-GMS**

Dear Chief Judge Sleet:

We represent Rohm and Haas Electronic Materials in the above-referenced case. We wish to inform the Court of recent developments at the United States Patent and Trademark Office (USPTO) regarding the reexamination of the two patents in suit, U.S. Patent Nos. 6,472,128 and 6,773,864.

As the Court will recall, the defendant, Honeywell International Inc. filed reexaminations of both the 128 and 864 patents. On October 1, 2007, the USPTO issued a Final Office Action in the reexamination of the 128 patent. While finally rejecting some claims, after amendment, the PTO held patentable and confirmed claims 5-16 which are asserted claims against Honeywell. New claims 17-22 were also found to be allowable. A copy of the Final Office Action is enclosed. Additionally, asserted claims 1-4 were rejected based only on nonstatutory obviousness-type double patenting and this rejection is expected to be overcome via a terminal disclaimer. Thus, the effect of the Final Office Action is that all of the asserted claims (to date) of the 128 patent should be confirmed to be patentable when the reexamination is concluded.

Regarding the 864 patent reexamination, on September 28, 2007, the USPTO issued a non-final first Office Action rejecting all but claims 5 and 16. Claims 5 and 16 were not asserted against Honeywell in the litigation. Rohm and Haas intends to file an appropriate response to the non-final Office Action in due course. A copy of the non-final Office Action is also enclosed.



CONNOLLY BOVE LODGE & HUTZ LLP

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If the Court has any questions, please do not hesitate to contact me.

Respectfully,

/s/ Rudolf E. Hutz
Connolly Bove Lodge & Hutz LLP

Enclosures

cc: James D. Taylor, Jr. (by email)
Constance Huttner (by email)

EXHIBIT 1



UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
90/008,359	12/04/2006	6472128		8757

53884 7590 10/01/2007

ROHM AND HAAS ELECTRONIC MATERIALS LLC
455 FOREST STREET
MARLBOROUGH, MA 01752

EXAMINER

ART UNIT PAPER NUMBER

DATE MAILED: 10/01/2007

Please find below and/or attached an Office communication concerning this application or proceeding.



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SKADDEN ARPS SLATE MEAGHER & FLOM LLP

FOUR TIMES SQUARE

NEW YORK, NY 10036

EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO. 90/008,359.

PATENT NO. 6472128.

ART UNIT 3991.

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified *ex parte* reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the *ex parte* reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

Office Action in Ex Parte Reexamination	Control No. 90/008,359	Patent Under Reexamination 6472128	
	Examiner Stephen J. Stein	Art Unit 3991	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

- a ☒ Responsive to the communication(s) filed on 19 July 2007. b ☒ This action is made FINAL.
c ☒ A statement under 37 CFR 1.530 has not been received from the patent owner.

A shortened statutory period for response to this action is set to expire 2 month(s) from the mailing date of this letter. Failure to respond within the period for response will result in termination of the proceeding and issuance of an *ex parte* reexamination certificate in accordance with this action. 37 CFR 1.550(d). **EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).** If the period for response specified above is less than thirty (30) days, a response within the statutory minimum of thirty (30) days will be considered timely.

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

- | | |
|---|---|
| 1. <input checked="" type="checkbox"/> Notice of References Cited by Examiner, PTO-892. | 3. <input type="checkbox"/> Interview Summary, PTO-474. |
| 2. <input checked="" type="checkbox"/> Information Disclosure Statement, PTO/SB/08. | 4. <input type="checkbox"/> _____. |

Part II SUMMARY OF ACTION

- 1a. ☒ Claims 1-31 are subject to reexamination.
1b. ☐ Claims _____ are not subject to reexamination.
2. ☐ Claims _____ have been canceled in the present reexamination proceeding.
3. ☒ Claims 5-22 are patentable and/or confirmed.
4. ☒ Claims 1-4, 24 and 28-31 are rejected.
5. ☒ Claims 23 and 25-27 are objected to.
6. ☐ The drawings, filed on _____ are acceptable.
7. ☐ The proposed drawing correction, filed on _____ has been (7a) ☐ approved (7b) ☐ disapproved.
8. ☐ Acknowledgment is made of the priority claim under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some* c) ☐ None of the certified copies have
 1 ☐ been received.
 2 ☐ not been received.
 3 ☐ been filed in Application No. _____.
 4 ☐ been filed in reexamination Control No. _____.
 5 ☐ been received by the International Bureau in PCT application No. _____.
 * See the attached detailed Office action for a list of the certified copies not received.
9. ☐ Since the proceeding appears to be in condition for issuance of an *ex parte* reexamination certificate except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte* Quayle, 1935 C.D. 11, 453 O.G. 213.
10. ☐ Other: _____

cc: Requester (if third party requester)

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Reexamination

1. This is a **Final Office Action** in the Reexamination proceeding of U.S. 6,472,128 issued on October 29, 2002 to Thackeray at al. ('128 patent). The application on which the patent was granted, 09/924,045, was filed on August 7, 2001 and is a continuation of 08/650,144, now US patent 6,451,504, filed April 30, 1996 and which is a continuation of U.S. 07/792,482, now U.S. 6,165,697, filed November 15, 1999. The earliest effective filing date of the patent is November 15, 1999.

Procedural Posture

2. A request for Reexamination was filed on December 4, 2006 by the third party Requester. An order for reexamination was granted on January 25, 2007. The patent owner did not file a statement under 37 CFR 1.530. A First Office Action was mailed on April 9, 2007, 2007. Patent Owner filed an amendment and response to the Office Action on June 11, 2007. An Interview between Patent Owner's representatives and the Examiner was conducted on July 12, 2007. Patent Owner filed a supplemental response on July 19, 2007.

Litigation Reminder

3. The patent owner is reminded of the continuing responsibility under 37 CFR 1.565(a) to apprise the Office of any litigation activity, or other prior or concurrent proceeding, involving the '128 patent throughout the course of this reexamination proceeding. The third party requester is also reminded of the ability to similarly apprise

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the Office of any such activity or proceeding throughout the course of this reexamination proceeding. See MPEP §§ 2207, 2282 and 2286.

Claim Interpretation

4. In reexamination, patent claims are construed broadly. In re Yamamoto, 740 F.2d 1569, 1571, 222 USPQ 934, 936 (Fed. Cir. 1984) (claims are given "their broadest reasonable interpretation consistent with the specification").

Claims

5. Claim 1, 5, 24 and 28 are independent claims. Claims 2-4 and 23 depend from claim 1 and claims 6-22 depend from claim 5, Claims 25-26 depend from claim 24 and Claims 29-31 depend from Claim 28.

Representative Claims

Claim 1. (Amended) A coated substrate comprising:
a substrate having thereon:
a coating layer of an antireflective composition, the antireflective composition comprising a crosslinker and an anthracene material; and
a coating layer of a positive photoresist composition over the antireflective composition coating layer.

Claim 5. (Amended) A method for forming a relief image on a substrate comprising:
applying on the substrate a layer of an antihalation composition comprising an anthracene material; and

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applying over the antihalation composition coating layer a positive photoresist composition.

Claim 24. (New) A method for forming a relief image on a substrate comprising: applying on the substrate a layer of an antihalation composition comprising anthracene material;

applying over the antihalation composition coating layer a photoresist composition; and

exposing the applied photoresist composition to patterned radiation having a wavelength of 248 nm.

Claim 28. (New) A method for forming a relief image on a substrate comprising:

applying on the substrate a layer of an antihalation composition comprising an anthracene material;

crosslinking the antihalation composition layer; and
applying over the crosslinked antihalation composition coating layer a photoresist composition.

Double Patenting

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

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A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. Claims 1-4 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 9 and 12 of U.S. Patent No. 5,851,730.

Although the conflicting claims are not identical, they are not patentably distinct from each other because while the '128 patent does not explicitly claim that the antihalation layer comprises a resin binder and or that the photoresist layer comprises resin binder and a radiation sensitive component, it would have been obvious to a person of ordinary skill in the art to have the antihalation layer of the '128 patent comprise a resin binder capable of reacting with a cross-linker and to have the photoresist layer of the '128 patent comprises a resin binder and a radiation sensitive component since such photo-reactive composition layers were known to be conventionally made of resins binders such as novalak which react with cross-linkers and light sensitive compounds (radiation sensitive components) (See for example U.S. 4,943,511 and U.S. 4,863,829).

Claim Rejections - 35 USC § 102

8. Claim 28 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 4,935,320 (Rohde).

Regarding claim 28, Rohde discloses preparing a coated material comprising (1) a substrate that can bear a relief image, (2) a photostructable negative working adhesive

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layer made of polyimide homo- and co-polymers, and (3) a self-supporting photo-crosslinkable polyimide film (photoresist layer) (See column 4, lines 10-15 and column 11, lines 25-32). Rohde further teaches that the adhesive layer may contain anti-halo dyes additives (an additive which provides antireflective and antihalation properties) (See column 31, lines 5-12 and column 11, lines 27-51). Rohde further teaches that the polyimide homo- and co-polymers which are useful in the both the adhesive layer and photocrosslinkable film layer are formed from repeating units of formula (Ia) and (Ib): (See column 11, lines 27-54). In these formulas, X and X' are the same or different divalent radicals of aromatic diamines, and Z' is a tetravalent aromatic radical (See column. 4, lines 59-62) and Z' is preferably one of five aromatic moieties, one of which is anthracene. Rohde also describes other anthracene-containing copolymers, represented by formula (II) and (III) (See column 11 lines 43-68). The anthracene embodiments of these formulas are specifically described at column 26, line 36 - column 27, line 49). Rohde still further discloses that the polyamide polymer class of adhesives may include an organic chromophoric polyazide (an azide crosslinker) (See column 13, lines 13-27). Such cross-linkers will inherently crosslink with the resins contained in adhesive layer when exposed to light or heat.

Regarding claim 29, Rohde discloses exposing a substrate coated with an antihalation adhesive layer and a photoresist layer to actinic radiation and thereafter developing them with developer to produce a relief image on the polyimide photoresist layer (See column 32, lines 32-48).

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9. Claim 30 and 31 are rejected under 35 U.S.C. 103(a) as being obvious over U.S. Patent No. 4,935,320 (Rohde) as applied to claims 28 and 29 above and further in view of U.S. 4,910,122 Arnold.

Rohde fails to disclose the limitation that the areas bared of photoresist upon treatment with the developer are etched (claim 30) or are exposed to plasma gas (claim 31).

Arnold discloses a process of coating antihalation compositions on a substrate and applying a layer of photoresist over the antihalation composition, followed by (1) exposing the resulting coated substrate to activating radiation, (2) developing the exposed photoresist, and (3) etching the coated substrate using an oxygen plasma (a plasma gas)(See column 4, lines 49-57). Arnold further discloses that using a dry etch process, such as a plasma etching process, allows the vehicle to be rapidly removed (See column 3, lines 48-53).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to use oxygen plasma (a plasma gas) as disclosed by Arnold as the etchant for removing the developed areas of the antihalation layer of Rohde since dry etching techniques such as oxygen plasma etching are disclosed to be a rapid method of etching during manufacture.

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Claim Rejections - 35 USC § 103

10. Claim 24 is rejected under 35 U.S.C. 103(a) as being obvious over by U.S. Patent No. 4,935,320 (Rohde) in view of U.S. Patent 4,910,122 (Arnold) as evidenced by Silverstein et al., *Spectrometric Identification of Organic Compounds*, Third Edition, John Wiley & Sons, 1974, pages 252-253 (Silverstein).

Regarding claim 24, Rohde discloses a coated material comprising (1) a substrate that can bear a relief image, (2) a photostructable negative working adhesive layer made of polyimide homo- and co-polymers, and (3) a self-supporting photocrosslinkable polyimide film (photoresist layer) (See column 4, lines 10-15 and column 11, lines 25-32). Rohde further teaches that the adhesive layer may contain anti-halo dyes additives (an additive which provides antireflective and antihalation properties) (See column 31, lines 5-12 and column 11, lines 27-51). Rohdes further teaches that the polyimide homo- and co-polymers which are useful in the both the adhesive layer and photocrosslinkable film layer are formed from repeating units of formula (Ia) and (Ib) (See column 11, lines 27-54). In these formulas, X and X' are the same or different divalent radicals of aromatic diamines, and Z' is a tetravalent aromatic radical (See column. 4, lines 59-62) and Z' is preferably one of five aromatic moieties, one of which is anthracene. Rohde also describes other anthracene-containing copolymers, represented by formula (II) and (III) (See column 11 lines 43-68). The anthracene embodiments of these formulas are specifically described at column 26, line 36 - column 27, line 49). Rohde still further discloses that the polyamide polymer class

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of adhesives may include an organic chromophoric polyazide (an azide crosslinker) (See column 13, lines 13-27). Rohde still further discloses that the adhesive layer (antihalation layer) may include a crosslinker as well as resins. Rohde further discloses that the coated material is exposed to light (See columns 1 and 2). Such cross-linkers will inherently crosslink with the resins contained in adhesive layer when exposed to light or heat.

Rohde finally discloses exposing a substrate coated with an antihalation adhesive layer and a photoresist layer to actinic radiation and thereafter developing them with developer to produce a relief image on the polyimide photoresist layer (See column 32, lines 32-48).

Silverstein evidences that the anthracene (in the adhesive layer) highly absorbs in the deep UV band and shows the max peak of absorbance ranges around 250nm (See Table XXI, page 252 and Figure 7). While the Rohde prior art does disclose exposing the polyimide photoresist layer to actinic radiation, it does not disclose exposing the applied self-supporting photocrosslinkable film (photoresist layer) to patterned radiation having a wavelength of 248nm.

Arnold teaches that dyes to be used for antireflection are those that absorb in the wavelength region of the imaging source (See column 4, lines 26-28).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to expose the applied self supporting photocrosslinkable resist layer overlying the anthracene containing antireflection layer disclose by Arnold to

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patterned radiation at 248nm in view of Arnold's teaching of the importance of matching the wavelength of the imaging source with the absorbance antireflection dye.

Allowed/Confirmed Claims

11. Amended claims 5-22 are allowable over the prior art of record.
12. New claim 23 is objected to as being dependent on amended base claim 1, but would be allowable if incorporated in the base claim.
13. New dependent claims 25-27 are objected to as being dependent on new rejected base claim 24, but would be allowed if incorporated into the base claim.

STATEMENT OF REASONS FOR PATENTABILITY AND/OR CONFIRMATION

The following is an examiner's statement of reasons for patentability and/or confirmation of the claims found patentable in this reexamination proceeding:

Regarding claims 5-23, the primary reasons for the indication of allowability are (1) Patent Owner's arguments distinguishing anthracene as claimed from the anthroquinones to overcome the rejections over the Jain, Arnold and Koshimo prior art references and (2) Patent Owner's Amendment to independent claims 1 and 5 adding the limitation "positive-acting photoresist" so as to overcome the rejections over the Rohde prior art reference.

While each of the Jain, Arnold and Koshimo prior art references disclose an antihalation/antireflective layer sandwiched between a substrate and a photosensitive resist layer, each of the Jain, Arnold and Koshimo disclose that the photosensitive

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material in the antihalation/antireflective layer is an *anthraquinone*, however, the references fail to teach or suggest the presence of an "anthracene material" in the antihalation/antireflective layer.

Regarding the rejections over the Rohde prior art reference, Patent Owner has amended independent claims 1 and 5 to add the limitation "positive acting photoresist". While an examination of the prior art does disclose the availability of positive working photoresists based on polyimide or polyimide precursors (See US 5,302,489), it still would not have been obvious to one of ordinary skill in the art at the time of the invention to substitute a positive acting photoresist for the negative acting polyimide photoresists in the Rohde prior art reference since the antireflective adhesive layer (middle layer) is also negative acting. Thus, if one were to substitute a positive acting polyimide resist layer for the negative acting photoresist layer (top layer) of Rohde, it would destroy the functionality of the invention of Rohde. Dependent claims 6-23 contain patentable subject matter based on their dependence to independent claims 1 and 5.

Regarding new dependent claims 25 and 27, which are dependent on rejected base claim 24, the prior art fails to teach the claimed limitation that the "antihalation composition is crosslinked prior to applying the photoresist composition over the antihalation composition layer". In the Rohde prior art reference, there is no teaching or suggestion of crosslinking the anthracene containing adhesive layer prior to application of the polyimide resist layer. Further, since in Rohde, both the adhesive layer and the polyimide resist layer are both photocrosslinkable and because the exposure to the

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imaging light energy is not applied till the after the double coating is formed, there is no suggestion or motivation within the Rohde reference or the prior art as whole to cross-link the adhesive antireflective layer prior to application of the polyimide resist layer.

Regarding new dependent claim 26, which is dependent on independent claim 24, as stated above the Rohde prior art reference fails to teach or suggest the a positive acting resist as claimed in new dependent claim 26.

Any comments considered necessary by PATENT OWNER regarding the above statement must be submitted promptly to avoid processing delays. Such submission by the patent owner should be labeled: "Comments on Statement of Reasons for Patentability and/or Confirmation" and will be placed in the reexamination file.

Response to Patent Owner Arguments

14. Regarding the non-statutory obviousness-type double patenting rejection over US 5,851,738, Patent Owner has filed a terminal disclaimer over the 5,851,738 patent. Accordingly, the double patenting rejection has been withdrawn. A new obviousness-type double patenting rejection has been made to claims 1-4 over US 5,851,730.

Regarding the rejections over the Jain, Koshimo and Arnold prior art references, Patent Owner argues that Jain, Koshimo and Arnold each disclose "anthroquinone" compounds in the anthalation/antireflective layer, but fail to teach or suggest the claimed anthracene compounds as recited in amended independent claims 1 and 5 and new independent claims 24 and 28. These arguments have been deemed persuasive

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and the rejections over the Jain, Koshimo and Arnold prior art references have been withdrawn.

Regarding the rejections over the Rohde prior art reference, Patent Owner has amended independent claims 1 and 5 to add the limitation "positive acting photoresist" and argues that the Rohde reference only discloses negative acting photoresists. Patent Owner further argues that Rohde teaches negative acting photoresists only and that "it has been recognized that polyimide compositions are more typically employed as negative-acting compositions, Enclosed is a copy of an article *HD Micro Puts Out Positive Polyimide*, Electronic News (June 19, 2000), which states 'Virtually all the polyimides (before now) have been negative tone polyimides' ". As stated above, an examination of the prior art does disclose the availability of positive working photoresists based on polyimide or polyimide precursors (See US 5,302,489), however, it would not have been obvious to one of ordinary skill in the art at the time of the invention to substitute a positive acting photoresist for the negative acting polyimide photoresists in the Rohde prior art reference since the antireflective adhesive layer (middle layer) is also negative acting. Thus, if one were to substitute a positive acting polyimide resist layer for the negative acting photoresist layer (top layer) of Rohde, it would destroy the functionality of the invention of Rohde. Accordingly, the rejections to independent claims 1 and 5 and their dependent claims over the Rohde prior art reference have been withdrawn. Regarding the newly added independent claim 24, Patent Owner argues that Rohde fails to teach exposing the applied photoresist composition to patterned radiation having a wavelength of 248nm as claimed in claim 24

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and that Rohde images at a significantly higher wavelength. This argument has been considered, however, a rejection under 35 USC 103 as been made over the Rohde reference in view of the Arnold reference to this newly presented claim. Regarding the rejection over new independent claim 28, Patent Owner argues that “[n]ew independent claim 28 recites ‘crosslinking the antihalation composition layer; and applying over the crosslinked antihalation composition coating layer a photoresist composition.’ Such crosslinking and application of a photoresist composition is not disclosed in Rohde”.

This argument has been considered and it is unclear if Patent Owner is arguing the that antihalation layer of Rohde is not crosslinked at all, or is arguing that it is not cross-linked prior to application of the photoresist layer. Either interpretation is not persuasive to overcome a rejection over the Rohde reference. First, as set forth in the rejections above, Rohde does specifically disclose that the adhesive layer (antihalation layer) may include a cross-linker as well as resins which are exposed to light (See columns 1 and 2). Such cross-linkers will inherently crosslink with the resins contained in adhesive layer when exposed to light or heat. Second, independent claim 28 does not require any specific order to the steps disclosed in the claimed method other than the order they are written in. “It is improper to read a specific order of steps into method claims where, as a matter of logic or grammar, the language of the method claims did not impose a specific order on the performance of the method steps, and the specification did not directly or implicitly require a particular order” See MPEP 2111.01 (II).

Accordingly, since claim 28 is not limited by the order of the steps, a rejection over the Rohde prior art reference is deemed proper.

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Conclusion

15. Claims 1-4, 24 and 28-31 are rejected.
16. Claims 23 and 25-27 are objected to as being dependent on a rejected base claim.
17. Claims 5-22 are allowable.
18. Patent owner's amendment filed June 11, 2007 necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

A shortened statutory period for response to this action is set to expire 2 months from the mailing date of this action.

Extensions of time under 37 CFR 1.136(a) do not apply in reexamination proceedings. The provisions of 37 CFR 1.136 apply only to "an applicant" and not to parties in a reexamination proceeding. Further, in 35 U.S.C. 305 and in 37 CFR 1.550(a), it is required that reexamination proceedings "will be conducted with special dispatch within the Office."

Extensions of time in reexamination proceedings are provided for in 37 CFR 1.550(c). A request for extension of time must be filed on or before the day on which a response to this action is due, and it must be accompanied by the petition fee set forth in 37 CFR 1.17(g). The mere filing of a request will not effect any extension of

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time. An extension of time will be granted only for sufficient cause, and for a reasonable time specified.

The filing of a timely first response to this final rejection will be construed as including a request to extend the shortened statutory period for an additional month, which will be granted even if previous extensions have been granted. In no event, however, will the statutory period for response expire later than SIX MONTHS from the mailing date of the final action. See MPEP § 2265.

In order to ensure full consideration of any amendments, affidavits of declarations, or other documents as evidence of patentability, such documents must be submitted in response to this Office action. Submissions after this final action are governed by the requirements of 37 CFR 1.116. While, submissions after appeal are governed by 37 CFR 41.33 after appeal.

NOTICE RE PATENT OWNER'S CORRESPONDENCE ADDRESS

19. Effective May 16, 2007, 37 CFR 1.33(c) has been revised to provide that:

The patent owner's correspondence address for all communications in an *ex parte* reexamination or an *inter partes* reexamination is designated as the correspondence address of the patent.

Revisions and Technical Corrections Affecting Requirements for Ex Parte and Inter Partes Reexamination, 72 FR 18892 (April 16, 2007)(Final Rule)

The correspondence address for any pending reexamination proceeding not having the same correspondence address as that of the patent is, by way of this revision to 37 CFR 1.33(c), automatically changed to that of the patent file as of the effective date.

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This change is effective for any reexamination proceeding which is pending before the Office as of May 16, 2007, including the present reexamination proceeding, and to any reexamination proceeding which is filed after that date.

Parties are to take this change into account when filing papers, and direct communications accordingly.

In the event the patent owner's correspondence address listed in the papers (record) for the present proceeding is different from the correspondence address of the patent, it is strongly encouraged that the patent owner affirmatively file a Notification of Change of Correspondence Address in the reexamination proceeding and/or the patent (depending on which address patent owner desires), to conform the address of the proceeding with that of the patent and to clarify the record as to which address should be used for correspondence.

Telephone Numbers for reexamination inquiries:

Reexamination and Amendment Practice	(571) 272-7703
Central Reexam Unit (CRU)	(571) 272-7705
Reexamination Facsimile Transmission No.	(571) 273-9900

Future Correspondence

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen Stein whose telephone number is 571-272-1544. The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 5:00 p.m. If the attempts to reach the examiner are unsuccessful, the examiner's supervisor, Deborah Jones can be reached by dialing 571-272-1535. The official fax number for the organization where this application is assigned is 571-273-9900.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

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Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

you have questions on access to the Private PAIR system, contact the Electronic

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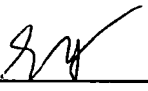
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September 28, 2007


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Art Unit 3991

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EXHIBIT 2



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
90/008,360	01/19/2007	6773864		8758

21874 7590 09/28/2007

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EXAMINER

ART UNIT PAPER NUMBER

DATE MAILED: 09/28/2007

Please find below and/or attached an Office communication concerning this application or proceeding.



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THIRD PARTY REQUESTER'S CORRESPONDENCE ADDRESS

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EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO 90/008360

PATENT NO. 6,773,864

ART UNI 3992

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified ex parte reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the ex parte reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

Office Action in Ex Parte Reexamination	Control No. 90/008,360	Patent Under Reexamination 6773864	
	Examiner Alan Diamond	Art Unit 3991	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

- a ☐ Responsive to the communication(s) filed on _____. b ☐ This action is made FINAL.
c ☒ A statement under 37 CFR 1.530 has not been received from the patent owner.

A shortened statutory period for response to this action is set to expire 2 month(s) from the mailing date of this letter. Failure to respond within the period for response will result in termination of the proceeding and issuance of an *ex parte* reexamination certificate in accordance with this action. 37 CFR 1.550(d). **EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).** If the period for response specified above is less than thirty (30) days, a response within the statutory minimum of thirty (30) days will be considered timely.

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☒ Notice of References Cited by Examiner, PTO-892. 3. ☐ Interview Summary, PTO-474.
2. ☒ Information Disclosure Statement, PTO/SB/08. 4. ☐ _____

Part II SUMMARY OF ACTION

- 1a. ☒ Claims 1-24 are subject to reexamination.
1b. ☐ Claims _____ are not subject to reexamination.
2. ☐ Claims _____ have been canceled in the present reexamination proceeding.
3. ☒ Claims 5 and 16 are patentable and/or confirmed.
4. ☒ Claims 1-4, 6-15 and 17-24 are rejected.
5. ☐ Claims _____ are objected to.
6. ☐ The drawings, filed on _____ are acceptable.
7. ☐ The proposed drawing correction, filed on _____ has been (7a) ☐ approved (7b) ☐ disapproved.
8. ☐ Acknowledgment is made of the priority claim under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of the certified copies have

1 ☐ been received.

2 ☐ not been received.

3 ☐ been filed in Application No. _____.

4 ☐ been filed in reexamination Control No. _____.

5 ☐ been received by the International Bureau in PCT application No. _____.

* See the attached detailed Office action for a list of the certified copies not received.

9. ☐ Since the proceeding appears to be in condition for issuance of an *ex parte* reexamination certificate except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte* Quayle, 1935 C.D. 11, 453 O.G. 213.

10. ☐ Other: _____

cc: Requester (if third party requester)

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Reexamination

Decision Granting Ex Parte Reexamination

1. A Request pursuant to 37 CFR 1.510 for *ex parte* reexamination of claims 1-24 of U.S. Patent 6,773,864 (the '864 patent) was filed January 19, 2007 by Third Party. An Order granting *ex parte* reexamination of claims 1-24 of the '864 patent was mailed March 23, 2007. The Order stated that there was a substantial new question of patentability affecting claims 1-24 of the '864 patent.

Patent Owner's Statement

2. A Patent Owner's Statement under 37 CFR §1.530 has not been received.

Information Disclosure Statement

3. In the information disclosure statement (IDS) filed 01/19/2007, the citation for the "Silverstein" reference on the PTO-1449 form does not match Silverstein that is scanned into the instant IFW file. In particular, Silverstein in the instant IFW file is from the 5th edition, not the 4th edition, and the publication year is 1991, not 1981. The PTO-1449 form has been corrected with respect to Silverstein, and the corrected PTO-1449 form accompanies the instant Office action.

Additionally, the "Claim Chart" citation on the PTO-1449 for said IDS has been crossed out. Said Claim Chart has been considered but will not appear on the face of the patent.

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Scope of Claims

4. In reexamination, patent claims are construed broadly. *In re Yamamoto*, 740 F.2d 1569, 1571, 222 USPQ 934, 936 (Fed. Cir. 1984) (claims given "their broadest reasonable interpretation consistent with the specification"). The instant reexamination proceeding contains claims 1-24 drawn to a coated substrate and a method of forming a relief image on a substrate. Claims 1 and 12 are representative:

1. A coated substrate comprising: a substrate comprising: a coating layer of an antireflective composition, the antireflective composition comprising a silicon-containing material; and a coating layer of a chemically-amplified positive photoresist composition over the antireflective composition coating layer.

12. A method for forming a relief image on a substrate comprising: applying on the substrate a layer of an antireflective composition that comprises a silicon containing material; applying over the antireflective composition a chemically-amplified positive photoresist composition.

The '864 patent discloses that "a chemically amplified positive photoresist generates a catalytic photoproduct upon exposure to activating radiation. In a positive system, this photoproduct (e.g., acid) renders the exposed regions of the resist more developer soluble, for example by catalyzing a deprotection reaction of one or more of the resist components to liberate polar functional groups such as carboxy." (See col. 8, lines 44-50).

Claim Rejections - 35 USC § 103

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5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 1-4, 8-15 and 19-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brewer et al, "The reduction of standing-wave effect in positive photoresists," Journal of Applied Photographic Engineering, Vol. 7, No. 6, December 1981 (hereinafter "Brewer") in view of Arnold et al (U.S. Patent 4,910,122, hereinafter "Arnold"), Lamola et al, "Chemically Amplified Resists," Solid State Technology, August 1991, pages 53-60 (hereinafter "Lamola"), McKean, "Characterization of a novolac-based three-component deep-UV resist," Chem. Mater., Vol. 2, 1990, pages 619-624 (hereinafter "McKean"), Nalamasu et al, "Development of a chemically amplified positive (CAMP) resist material for single layer deep-UV lithography," SPIE Vol. 1262 Advances in Resist Technology and Processing VII, June 1990, pages 32-41 (hereinafter "Nalamasu"), Willson, "Organic resist materials – theory and chemistry, Introduction to Microlithography, American Chemical Society, 1983, pages 87-159 (hereinafter "Willson"), Ziger (U.S. Patent 5,126,289) and Silverstein et al, Spectrometric Identification of Organic Compounds, third edition, John Wiley & Sons, 1974, pages 252-253 (hereinafter "Silverstein").**

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Brewer teaches the reduction of the standing-wave effect in positive photoresists by a thin antireflective coating of a polyimide-silicone copolymer obtained from a polyamic acid-silicone copolymer (i.e., instant sole resin as in claims 3 and 14) containing a dye, wherein said antireflective coating is under a positive photoresist and over a silicon wafer (see the entire document, in particular the abstract). Brewer teaches that the polyimide-silicone copolymer is intended to overcome the difficulties with adhesion between the antireflective coating layer and the substrate (see p. 185, right col.) The exemplified positive photoresist is KTI 1350 (p. 184, left col.) Brewer teaches that when selecting a dye "[t]he most important criteria to be met are that the dye absorb light absorb at the 0.405- and 0.436-micron wavelengths at which the photoresist [i.e., the KTI 1350] is exposed and that the dye absorb strongly at these wavelengths (see p. 185, right col.) Accordingly, Brewer notes there are many dyes that can be used, although Brewer selects sudan orange or methyl red, whose absorbance spectra is seen in Figure 3 at page 186 (see p. 184, right col.; and p. 185, right col.) More generally, it is well known in the art that dyes to be used for antireflection are those that absorb in the wavelength region of the imaging source, as taught by Arnold (see col. 4, lines 26-28). Brewer's polyimide is obtained by heating polyamic acid, i.e. acid of instant claim 9 (see p. 184). Both polyimide and polyamic acid are present in the antireflective coating since Brewer avoids complete conversion of polyamic acid to polyimide so that etching can take place with photoresist developer (see p. 186).

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With respect to claims 10 and 23, Brewer's antireflective coating is non-photoimageable since there are no components in the coating that are photoreactive.

Brewer teaches the limitations of the instant claim other than the differences which are discussed below.

While Brewer exemplifies KTI 1350 positive photoresist, it is not limited to this photoresist. Brewer does not specifically teach that its positive photoresist can be a chemically-amplified positive photoresist. Lamola, McKean, Nalamasu and Willson are relied upon for teaching a chemically-amplified positive photoresist which is said to be useful in deep-UV applications to improve the resolution of narrow line widths (see the entire document of each of Lamola, McKean and Nalamasu; and pages 151-154 of Willson). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a chemically-amplified positive photoresist for Brewer's positive photoresist so as to improve the resolution of narrow line widths.

As noted above, the chemically-amplified positive photoresists are used in deep-UV applications. As also noted above, Arnold teaches that dyes to be used for antireflection are those that absorb in the wavelength region of the imaging source. Thus, a skilled artisan would recognize that when using a chemically-amplified positive photoresist, the dye or absorptive material needed for Brewer's antireflective coating is one that absorbs in the deep UV, e.g., around 250 nm as taught by Lamola at page 53; 200-300 nm as taught by McKean at page 619; and 240-265 nm as taught by Nalamasu at page 32. Deep UV absorptive materials are well known. For example, Ziger teaches an antireflection coating for use in photolithographic processes, wherein the dye or UV

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absorbing material has strong absorption at the 250-280 nm range (see abstract; and col. 3, lines 32-41). Silverstein shows that compounds such as anthracene, naphthalene, phenanthrene and naphthacene absorb strongly at deep UV wavelengths (see Table XXI on page 252 and Figure 7 on page 253). The sudan orange taught by Brewer absorbs strongly in deep UV. Accordingly, when a chemically-amplified positive photoresist is used as Brewer's positive photoresist, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected a well known deep UV absorbing dye or material, such as the dyes/materials disclosed by Ziger and Silverstein or said sudan orange disclosed by Brewer.

With respect to claims 4 and 15, which require that the silicone-containing resin of the antireflective composition is present in combination with other resins, it is noted that Brewer's resin can be a polyimide obtained from polyamic acid, or can be a polyimide-silicone copolymer obtained from a polyamic acid-silicone copolymer (see page 184). Likewise, Arnold teaches that polyamic acid polymers and copolymers can be used for the polymer material of an antireflective coating (see col. 2, lines 15-38). Arnold discloses other polymers, such as sulfur dioxide polymers, poly(epichlorohydrin), etc, that can be used (see col. 4, lines 4-25). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used Brewer's polyimide-silicon copolymer in combination with a polyimide or any other known polymer for an antireflective composition, such as a sulfur dioxide polymers, poly(epichlorohydrin), etc, because these polymers are know to be useful for forming an

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antireflective coating as shown by Brewer and Arnold, and the resulting expectation of a functioning antireflective layer.

With respect to claims 21 and 22, which require "areas bared of photoresist upon development are etched" and "areas bared of photoresist upon treatment with the developer are exposed to plasma gas", it is noted that such etching is commonplace in the art. In particular, Arnold discloses a process of coating antireflective compositions on a substrate and applying a layer of photoresist over the antireflective composition, followed by (1) exposing the resulting coated substrate to activating radiation, (2) developing the exposed photoresist and (3) etching the coated substrate using an oxygen plasma (a plasma gas)(see col. 4, lines 49-57). Arnold further discloses that using a dry etch process, such as a plasma etching process, allows the vehicle (portions of the antireflective layer) to be rapidly removed (see col. 3, lines 48-53).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use oxygen plasma (a plasma gas) as disclosed by Arnold as the etchant for removing the developed areas of Brewer's antireflective layer since dry etching techniques such as oxygen plasma etching are disclosed to be a rapid method of etching during manufacture.

7. Claims 1-4, 6-9, 11-15, 17-22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain (U.S. Patent 4,863,827) in view of Arnold, Lamola, McKean, Nalamasu, Willson, Ziger and Silverstein.

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Jain teaches a process for forming a multi-level, positive working photosensitive element, wherein this multi-level element comprises a substrate coated with a first and a second photosensitive layer (see abstract; and col. 17, lines 51-58). The first photosensitive layer (i.e., bottom photoresist layer) is formed using an alkali soluble resin, such as a novolak or polyvinyl phenol resin, an o-quinonediazide compound, and an in-situ generated, acid catalyzed crosslinker compound (see col. 4, line 29 through col. 5, line 9; and col. 16, line 49 through col. 17, line 30). When the quinonediazide compound is exposed to actinic radiation, it generates an acid (as per instant claim 9) which catalyzes a crosslinking reaction between the alkali soluble resin and the crosslinker compound (see col. 5, lines 1-7; and col. 16, lines 49-53). The degree of crosslinking may be controlled by adjusting the dosage and temperature of the post-exposure bake, but if no post-exposure bake is used, the bottom photoresist layer behaves as a conventional positive resist (see col. 2, lines 53-68). Jain still further discloses additives such as organic dyes and adhesion promoters may be added to the first photosensitive layer before it is coated on the substrate, and that dyes help provide increased resolution by inhibiting the back scattering of light off the substrate (see col. 17, lines 59-64). The absorption of the dye added to the first photosensitive layer should be at the same wavelength as that used to image the top photoresist layer (i.e., the second photosensitive layer) when the substrate is highly reflective (see col. 3, lines 14-20). Accordingly, Jain's first photosensitive layer is an antireflective layer.

The disclosed adhesion promoters, which are used at a concentration up to 4% by weight, include silicon-containing materials such as, β -(3,4-epoxy-cyclohexyl)-

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ethyltrimethoxysilane; p-methyl-disilanemethyl methacrylate; vinyltrichlorosilane; and γ -amino-propyl triethoxysilane (see col. 18, lines 17-35). Thus, Jain's first photosensitive layer has a silicon-containing material.

With respect to claims 2, 3, 13 and 14, the resin of the first photosensitive layer can be a sole resin such as novolak, paravinylphenol or polyvinylphenol (see col. 16, lines 49-53). In view of the chemical structure of said adhesion promoters, i.e., of said β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane; p-methyl-disilanemethyl methacrylate; vinyltrichlorosilane; and γ -amino-propyl triethoxysilane, it is the Examiner's position that the adhesion promoter covalently bonds at one of its ends to the resin and at its other end to the substrate. For example, with β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, the epoxy would bond to the paravinylphenol or polyvinylphenol, whereas the silane would bond to a silicon or silicon dioxide surface. Thus, since the adhesion promoter is covalently attached to the resin and contains silicon, the resin of Jain's first photosensitive layer is a silicon-containing resin.

With respect to claims 11 and 24, suitable substrates include silicon, such as a silicon wafer (see col. 18, lines 64-68; and col. 21, line 32).

The first photosensitive layer is coated on said substrate, dried and crosslinked (see col. 4, lines 17-19; Example 1, col. 21). The second photosensitive layer is then applied over the first layer (see col. 5, lines 19-25; Example 1, col. 21).

The second photosensitive layer, like the first photosensitive layer is a positive photoresist (see col. 2, lines 67-68; and col. 4, lines 12-20). The second photosensitive layer is exposed through a mask and developed in the conventional way. It may be

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further etched using a suitable etchant (see col. 2, lines 16-50; col. 5, lines 26-32; and Example 1, col. 21).

Jain also discloses removing the exposed portions of the first photosensitive composition (etching), as per instant claim 21 (see col. 5, lines 29-32)

As seen in Example 1, Jain exemplifies a top photoresist layer (i.e., second photosensitive layer) having a novolac resin system.

Jain teaches the limitations of the instant claims, other than the differences which are discussed below.

Jain does not specifically teach that its top photoresist layer can be a chemically-amplified positive photoresist. Lamola, McKean, Nalamasu and Willson are relied upon for teaching a chemically-amplified positive photoresist which is said to be useful in deep-UV applications to improve the resolution of narrow line widths (see the entire document of each of Lamola, McKean and Nalamasu; and pages 151-154 of Willson). Indeed, McKean teaches that processing of the chemically-amplified positive photoresist is very similar to a novolac resin system but provides nearly a 100-fold increase in sensitivity (see abstract). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a chemically-amplified positive photoresist for Jain's top photoresist layer, in place of, for example, the novolac resin system exemplified by Jain, so as to improve the resolution of narrow line widths.

As noted above, the chemically-amplified positive photoresists are used in deep-UV applications. As also noted above, Arnold teaches dyes to be used for antireflection are those that absorb in the wavelength region of the imaging source, and Jain teaches

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that the dye added to the bottom photoresist layer should absorb at the same wavelength as that used to image the top photoresist layer. Thus, when using a chemically-amplified positive photoresist for Jain's top photoresist layer, the dye or absorptive material used in Jain's bottom photoresist layer is one that absorbs in the deep UV, e.g., around 250 nm as taught by Lamola at page 53; 200-300 nm as taught by McKean at page 619; and 240-265 nm as taught by Nalamasu at page 32. Deep UV absorptive materials are well known. For example, Ziger teaches an antireflection coating for use in photolithographic processes, wherein the dye or UV absorbing material has strong absorption at the 250-280 nm range (see abstract; and col. 3, lines 32-41). Silverstein shows that compounds such as anthracene, naphthalene, phenanthrene and naphthacene absorb strongly at deep UV wavelengths (see Table XXI on page 252 and Figure 7 on page 253). Accordingly, when a chemically-amplified positive photoresist is used as Jain's top photoresist layer, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected a well known deep UV absorbing dye or material, such as the dyes/materials disclosed by Ziger and Silverstein.

As noted above, since Jain's silicon-containing adhesion promoter is covalently attached to the resin, then the resin of Jain's first photosensitive layer is a silicon-containing resin. With respect to claims 4 and 15, which require that the silicone-containing resin of the antireflective composition is present in combination with other resins, Jain does not specifically teach using a combination of resins instead of a single resin to form the first photosensitive layer. As also noted above, Jain teaches that its

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first photosensitive layer can be, for example, a novolak, paravinylphenol or polyvinylphenol. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a mixture of Jain's resins in place of a single resin for forming Jain's first photosensitive layer because the resins have the same function in the first photosensitive layer and the resulting expectation of a functioning first photosensitive layer.

With respect to claim 22, Jain does not specifically disclose that the areas bared of photoresist are upon treatment with the developer, are exposed to plasma gas. Arnold discloses a process of coating antireflective compositions on a substrate and applying a layer of photoresist over the antireflective composition, followed by (1) exposing the resulting coated substrate to activating radiation, (2) developing the exposed photoresist and (3) etching the coated substrate using an oxygen plasma (a plasma gas) (see col. 4, lines 49-57). Arnold further discloses that using a dry etch process, such as a plasma etching process, allows the vehicle (portions of the antireflective layer) to be rapidly removed (see col. 3, lines 48-53). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use oxygen plasma (a plasma gas) as disclosed by Arnold as the etchant for removing the developed areas of the antireflective layer of Jain since dry etching techniques such as oxygen plasma etching are disclosed to be a rapid method of etching during manufacture.

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Double Patenting

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

9. Claims 1-4, 6-15 and 17-24 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-21 of U.S. Patent No. 5,851,730 (the '730 patent) in view of Jain, Arnold, Lamola, McKean, Nalamasu, Willson and Silverstein.

The claims of the '730 patent teach the limitations of instant claims 1-4, 6-15 and 17-24, the differences being that the claims of the '730 patent do not specifically require that the antihalation (antireflective) composition comprises a silicon-containing material, and that the positive photoresist (claim 21) is a chemically-amplified positive photoresist.

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Claim 1 of the '730 patent teaches that the antireflective composition comprises a binder and a crosslinker. Jain teaches adding an adhesion promoter, such as β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, p-methyl-disilanemethyl methacrylate, vinyltrichlorosilane, or γ -amino-propyl triethoxysilane, to its bottom photosensitive layer (bottom photoresist layer) that includes binder, crosslinker and dye, wherein the layer also functions as an antireflective layer (see col. 3, lines col. 4, line 29 through col. 5, line 9; col. 16, line 49 through col. 17, line 64; and col. 18, lines 35). Of course, the adhesion promoter would promote adhesion between the antireflective layer and the substrate, e.g., a silicon wafer, beneath it (see also col. 21, line 32). It is the Examiner's position that the adhesion promoter covalently bonds at one of its ends to Jain's resin and at its other end to the substrate. For example, with β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, the epoxy would bond to Jain's paravinylphenol or polyvinylphenol resin, whereas the silane would bond to a silicon or silicon dioxide surface. Thus, since the adhesion promoter is covalently attached to the resin and contains silicon, the resin of Jain's first photosensitive layer is a silicon-containing resin.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included an adhesion promoter, such as the β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, p-methyl-disilanemethyl methacrylate, vinyltrichlorosilane, or γ -amino-propyl triethoxysilane taught by Jain, in the antireflective layer of the claims of the '730 patent so as to improve adhesion between the resin binder and the substrate in the claims of the '730 patent.

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Further, Lamola, McKean, Nalamasu and Willson are relied upon for teaching a chemically-amplified positive photoresist which is said to be useful in deep-UV applications to improve the resolution of narrow line widths (see the entire document of each of Lamola, McKean and Nalamasu; and pages 151-154 of Willson). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a chemically-amplified positive photoresist for the positive photoresist in the claims of the '730 patent so as to improve the resolution of narrow line widths.

Arnold teaches dyes to be used for antireflection are those that absorb in the wavelength region of the imaging source (see col. 4, lines 26-28), and Jain teaches that the dye added to the bottom photoresist layer should absorb at the same wavelength as that used to image the top photoresist layer (see col. 3, lines 14-20). Thus, when using a chemically-amplified positive photoresist, the dye or absorptive material used in the antireflective layer should be one that absorbs in the deep UV, e.g., around 250 nm as taught by Lamola at page 53; 200-300 nm as taught by McKean at page 619; and 240-265 nm as taught by Nalamasu at page 32. Deep UV absorptive materials are well known. Silverstein shows that compounds such as anthracene, naphthalene, phenanthrene and naphthacene absorb strongly at deep UV wavelengths (see Table XXI on page 252 and Figure 7 on page 253). Accordingly, the anthracene material recited in the binder of the claims of the '730 patent (see claim 1) would absorb deep UV.

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10. Claims 1-4, 6-15 and 17-24 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-29 of U.S. Patent No. 5,851,738 (the '738 patent) in view of Jain, Arnold, Lamola, McKean, Nalamasu, Willson and Silverstein.

The claims of the '738 patent teach the limitations of instant claims 1-4, 6-15 and 17-24, the differences being that the claims of the '738 patent do not specifically require that the antihalation (antireflective) composition comprises a silicon-containing material, and that the positive photoresist (claim 20) is a chemically-amplified positive photoresist.

Claim 1 of the '738 patent teaches that the antireflective composition comprises a binder and a crosslinker. Jain teaches adding an adhesion promoter, such as β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, p-methyl-disilanemethyl methacrylate, vinyltrichlorosilane, or γ -amino-propyl triethoxysilane, to its bottom photosensitive layer (bottom photoresist layer) that includes binder, crosslinker and dye, wherein the layer also functions as an antireflective layer (see col. 3, lines col. 4, line 29 through col. 5, line 9; col. 16, line 49 through col. 17, line 64; and col. 18, lines 35). Of course, the adhesion promoter would promote adhesion between the antireflective layer and the substrate, e.g., a silicon wafer, beneath it (see also col. 21, line 32). It is the Examiner's position that the adhesion promoter covalently bonds at one of its ends to Jain's resin and at its other end to the substrate. For example, with β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, the epoxy would bond to Jain's paravinylphenol or polyvinylphenol resin, whereas the silane would bond to a silicon or silicon dioxide

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surface. Thus, since the adhesion promoter is covalently attached to the resin and contains silicon, the resin of Jain's first photosensitive layer is a silicon-containing resin.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included an adhesion promoter, such as the β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, p-methyl-disilanemethyl methacrylate, vinyltrichlorosilane, or γ -amino-propyl triethoxysilane taught by Jain, in the antireflective layer of the claims of the '738 patent so as to improve adhesion between the resin binder and the substrate in the claims of the '738 patent.

Further, Lamola, McKean, Nalamasu and Willson are relied upon for teaching a chemically-amplified positive photoresist which is said to be useful in deep-UV applications to improve the resolution of narrow line widths (see the entire document of each of Lamola, McKean and Nalamasu; and pages 151-154 of Willson). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a chemically-amplified positive photoresist for the positive photoresist in the claims of the '738 patent so as to improve the resolution of narrow line widths.

Arnold teaches dyes to be used for antireflection are those that absorb in the wavelength region of the imaging source (see col. 4, lines 26-28), and Jain teaches that the dye added to the bottom photoresist layer should absorb at the same wavelength as that used to image the top photoresist layer (see col. 3, lines 14-20). Thus, when using a chemically-amplified positive photoresist, the dye or absorptive material used in the antireflective layer should be one that absorbs in the deep UV, e.g., around 250 nm as taught by Lamola at page 53; 200-300 nm as taught by McKean at page 619; and 240-

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265 nm as taught by Nalamasu at page 32. Deep UV absorptive materials are well known. Silverstein shows that compounds such as anthracene, naphthalene, phenanthrene and naphthacene absorb strongly at deep UV wavelengths (see Table XXI on page 252 and Figure 7 on page 253). Accordingly, the anthracene material recited in the binder of the claims of the '738 patent (see claim 1) would absorb deep UV.

11. Claims 1-4, 6-15 and 17-24 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-25 of U.S. Patent No. 6,165,697 (the '697 patent) in view of Jain, Arnold, Lamola, McKean, Nalamasu, Willson and Silverstein.

The claims of the '697 patent teach the limitations of instant claims 1-4, 6-15 and 17-24, the differences being that the claims of the '697 patent do not specifically require that the antihalation (antireflective) composition comprises a silicon-containing material, and that the photoresist is a chemically-amplified positive photoresist.

Claim 1 of the '697 patent teaches that the antireflective composition comprises a crosslinked phenolic resin binder. Jain teaches adding an adhesion promoter, such as β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, p-methyl-disilanemethyl methacrylate, vinyltrichlorosilane, or γ -amino-propyl triethoxysilane, to its bottom photosensitive layer (bottom photoresist layer) that includes binder, crosslinker and dye, wherein the layer also functions as an antireflective layer (see col. 3, lines col. 4, line 29 through col. 5, line 9; col. 16, line 49 through col. 17, line 64; and col. 18, lines 35). Of course, the

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adhesion promoter would promote adhesion between the antireflective layer and the substrate, e.g., a silicon wafer, beneath it (see also col. 21, line 32). It is the Examiner's position that the adhesion promoter covalently bonds at one of its ends to Jain's resin and at its other end to the substrate. For example, with β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, the epoxy would bond to Jain's paravinylphenol or polyvinylphenol resin, whereas the silane would bond to a silicon or silicon dioxide surface. Thus, since the adhesion promoter is covalently attached to the resin and contains silicon, the resin of Jain's first photosensitive layer is a silicon-containing resin. A phenolic resin binder would have -OH groups, and thus, would bond with said adhesion promoters.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included an adhesion promoter, such as the β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, p-methyl-disilanemethyl methacrylate, vinyltrichlorosilane, or γ -amino-propyl triethoxysilane taught by Jain, in the antireflective layer of the claims of the '697 patent so as to improve adhesion between the crosslinked resin and the substrate in the claims of the '697 patent.

Further, Lamola, McKean, Nalamasu and Willson are relied upon for teaching a chemically-amplified positive photoresist which is said to be useful in deep-UV applications to improve the resolution of narrow line widths (see the entire document of each of Lamola, McKean and Nalamasu; and pages 151-154 of Willson). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a chemically-amplified positive photoresist for the positive photoresist in the

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claims of the '697 patent so as to improve the resolution of narrow line widths. It is noted that claim 1 recites that can be a polyvinyl phenol. However, it is noted that Willson teaches that polyvinyl phenols can be used in positive deep UV photoresist systems (see page 153). The chemically-amplified positive photoresists absorb in the deep UV as noted in the following paragraph.

Arnold teaches dyes to be used for antireflection are those that absorb in the wavelength region of the imaging source (see col. 4, lines 26-28), and Jain teaches that the dye added to the bottom photoresist layer should absorb at the same wavelength as that used to image the top photoresist layer (see col. 3, lines 14-20). Thus, when using a chemically-amplified positive photoresist, the dye or absorptive material used in the antireflective layer should be one that absorbs in the deep UV, e.g., around 250 nm as taught by Lamola at page 53; 200-300 nm as taught by McKean at page 619; and 240-265 nm as taught by Nalamasu at page 32. Deep UV absorptive materials are well known. Silverstein shows that compounds such as anthracene, naphthalene, phenanthrene and naphthacene absorb strongly at deep UV wavelengths (see Table XXI on page 252 and Figure 7 on page 253). Accordingly, for example, the anthracene material recited in the antireflective composition of the claims of the '697 patent (see claim 25) would absorb deep UV.

12. Claims 1-4, 6-15 and 17-24 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8 of U.S.

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Patent No. 6,451,503 (the '503 patent) in view of Jain, Arnold, Lamola, McKean, Nalamasu, Willson, Ziger and Silverstein.

The claims of the '503 patent teach the limitations of instant claims 1-4, 6-15 and 17-24, the differences being that the claims of the '503 patent do not specifically require that the antihalation (i.e., antireflective) coating comprises a silicon-containing material, and that a chemically-amplified positive photoresist layer is over the antireflective coating.

Claim 1 of the '503 patent teaches that the antireflective coating comprises a crosslinker and a resin binder containing anthracene. Jain teaches adding an adhesion promoter, such as β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, p-methyl-disilanemethyl methacrylate, vinyltrichlorosilane, or γ -amino-propyl triethoxysilane, to its bottom photosensitive layer (bottom photoresist layer) that includes binder, crosslinker and dye, wherein the layer also functions as an antireflective layer (see col. 3, lines col. 4, line 29 through col. 5, line 9; col. 16, line 49 through col. 17, line 64; and col. 18, lines 35). Of course, the adhesion promoter would promote adhesion between the antireflective layer and the substrate, e.g., a silicon wafer, beneath it (see also col. 21, line 32). It is the Examiner's position that the adhesion promoter covalently bonds at one of its ends to Jain's resin and at its other end to the substrate. For example, with β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, the epoxy would bond to Jain's paravinylphenol or polyvinylphenol resin, whereas the silane would bond to a silicon or silicon dioxide surface. Thus, since the adhesion promoter is covalently attached to the resin and contains silicon, the resin of Jain's first photosensitive layer is a silicon-

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containing resin. The resin binder in claim 1 of the '503 patent has -OH groups when R is hydrogen, and thus, would bond with said adhesion promoters.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included an adhesion promoter, such as the β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, p-methyl-disilanemethyl methacrylate, vinyltrichlorosilane, or γ -amino-propyl triethoxysilane taught by Jain, in the antireflective layer of the claims of the '503 patent so as to improve adhesion between the crosslinked resin and a substrate.

It is very well known in the art to coat a photoresist layer on an antireflective layer for the purpose of performing lithography, as shown by Ziger (see abstract) and Arnold (see entire document). Further, Lamola, McKean, Nalamasu and Willson are relied upon for teaching a chemically-amplified positive photoresist which is said to be useful in deep-UV applications to improve the resolution of narrow line widths (see the entire document of each of Lamola, McKean and Nalamasu; and pages 151-154 of Willson). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a chemically-amplified positive photoresist for the positive photoresist in the claims of the '503 patent so as to perform lithography and improve the resolution of narrow line widths thereof.

Arnold teaches dyes to be used for antireflection are those that absorb in the wavelength region of the imaging source (see col. 4, lines 26-28), and Jain teaches that the dye added to the bottom photoresist layer should absorb at the same wavelength as that used to image the top photoresist layer (see col. 3, lines 14-20). Thus, when using

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a chemically-amplified positive photoresist, the dye or absorptive material to be used in the antireflective layer is one that absorbs in the deep UV, e.g., around 250 nm as taught by Lamola at page 53; 200-300 nm as taught by McKean at page 619; and 240-265 nm as taught by Nalamasu at page 32. Deep UV absorptive materials are well known. Silverstein shows that compounds such as anthracene, naphthalene, phenanthrene and naphthacene absorb strongly at deep UV wavelengths (see Table XXI on page 252 and Figure 7 on page 253). Accordingly, the resin containing anthracene recited in the antireflective layer of the claims of the '503 patent (see claim 1) would absorb deep UV.

13. Claims 1-4, 6-15 and 17-24 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-16 of U.S. Patent No. 6,472,128 (the '128 patent) in view of Jain, Arnold, Lamola, McKean, Nalamasu, Willson and Silverstein.

The claims of the '128 patent teach the limitations of instant claims 1-4, 6-15 and 17-24, the differences being that the claims of the '128 patent do not specifically require that the antireflective composition comprises a silicon-containing material, and that the photoresist is a chemically-amplified positive photoresist.

Claim 1 of the '128 patent teaches that the antireflective composition comprises a crosslinker and an anthracene material, and claim 2 recites that the layer is crosslinked. Accordingly, a crosslinked resin is rendered obvious by claims 1 and 2. Jain teaches adding an adhesion promoter, such as β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane,

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p-methyl-disilanemethyl methacrylate, vinyltrichlorosilane, or γ -amino-propyl triethoxysilane, to its bottom photosensitive layer (bottom photoresist layer) that includes binder, crosslinker and dye, wherein the layer also functions as an antireflective layer (see col. 3, lines col. 4, line 29 through col. 5, line 9; col. 16, line 49 through col. 17, line 64; and col. 18, lines 35). Of course, the adhesion promoter would promote adhesion between the antireflective layer and the substrate, e.g., a silicon wafer, beneath it (see also col. 21, line 32). It is the Examiner's position that the adhesion promoter covalently bonds at one of its ends to Jain's resin and at its other end to the substrate. For example, with β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, the epoxy would bond to Jain's paravinylphenol or polyvinylphenol resin, whereas the silane would bond to a silicon or silicon dioxide surface. Thus, since the adhesion promoter is covalently attached to the resin and contains silicon, the resin of Jain's first photosensitive layer is a silicon-containing resin.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included an adhesion promoter, such as the β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, p-methyl-disilanemethyl methacrylate, vinyltrichlorosilane, or γ -amino-propyl triethoxysilane taught by Jain, in the antireflective layer of the claims of the '128 patent so as to improve adhesion between the crosslinked resin and the substrate in the claims of the '128 patent.

Further, Lamola, McKean, Nalamasu and Willson are relied upon for teaching a chemically-amplified positive photoresist which is said to be useful in deep-UV applications to improve the resolution of narrow line widths (see the entire document of

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each of Lamola, McKean and Nalamasu; and pages 151-154 of Willson). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a chemically-amplified positive photoresist for the positive photoresist in the claims of the '128 patent so as to improve the resolution of narrow line widths.

Arnold teaches dyes to be used for antireflection are those that absorb in the wavelength region of the imaging source (see col. 4, lines 26-28), and Jain teaches that the dye added to the bottom photoresist layer should absorb at the same wavelength as that used to image the top photoresist layer (see col. 3, lines 14-20). Thus, when using a chemically-amplified positive photoresist, the dye or absorptive material used in the antireflective layer should be one that absorbs in the deep UV, e.g., around 250 nm as taught by Lamola at page 53; 200-300 nm as taught by McKean at page 619; and 240-265 nm as taught by Nalamasu at page 32. Deep UV absorptive materials are well known. Silverstein shows that compounds such as anthracene, naphthalene, phenanthrene and naphthacene absorb strongly at deep UV wavelengths (see Table XXI on page 252 and Figure 7 on page 253). Accordingly, the anthracene material recited in the antireflective composition of the claims of the '128 patent (see claim 1) would absorb deep UV.

It is noted that this obviousness double patenting rejection has relied upon claims 1-16 of the issued '128 patent. It is noted that the '128 patent is currently under reexamination. See reexamination control No. 90/008,359. The instant claims are also obvious over current claims 1-31 in the 90/008,359 reexamination proceeding for the same reasons given above.

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14. Claims 1-4, 6-15 and 17-24 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-22 of U.S. Patent No. 6,528,235 (the '235 patent) in view of Jain, Arnold, Lamola, McKean, Nalamasu, Willson and Silverstein.

The claims of the '235 patent teach the limitations of instant claims 1-4, 6-15 and 17-24, the differences being that the claims of the '235 patent do not specifically require that the antireflective composition comprises a silicon-containing material, and that the photoresist is a chemically-amplified positive photoresist.

Claim 1 of the '235 patent teaches that the antireflective composition comprises a crosslinker, and claim 2 recites that the layer is crosslinked. Accordingly, a crosslinked resin is rendered obvious by claims 1 and 2. Jain teaches adding an adhesion promoter, such as β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, p-methyl-disilanemethyl methacrylate, vinyltrichlorosilane, or γ -amino-propyl triethoxysilane, to its bottom photosensitive layer (bottom photoresist layer) that includes binder, crosslinker and dye, wherein the layer also functions as an antireflective layer (see col. 3, lines col. 4, line 29 through col. 5, line 9; col. 16, line 49 through col. 17, line 64; and col. 18, lines 35). Of course, the adhesion promoter would promote adhesion between the antireflective layer and the substrate, e.g., a silicon wafer, beneath it (see also col. 21, line 32). It is the Examiner's position that the adhesion promoter covalently bonds at one of its ends to Jain's resin and at its other end to the substrate. For example, with β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, the epoxy would bond to Jain's

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paravinyphenol or polyvinylphenol resin, whereas the silane would bond to a silicon or silicon dioxide surface. Thus, since the adhesion promoter is covalently attached to the resin and contains silicon, the resin of Jain's first photosensitive layer is a silicon-containing resin.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included an adhesion promoter, such as the β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, p-methyl-disilanemethyl methacrylate, vinyltrichlorosilane, or γ -amino-propyl triethoxysilane taught by Jain, in the antireflective layer of the claims of the '235 patent so as to improve adhesion between the crosslinked resin and the substrate in the claims of the '235 patent.

Further, Lamola, McKean, Nalamasu and Willson are relied upon for teaching a chemically-amplified positive photoresist which is said to be useful in deep-UV applications to improve the resolution of narrow line widths (see the entire document of each of Lamola, McKean and Nalamasu; and pages 151-154 of Willson). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a chemically-amplified positive photoresist for the positive photoresist in the claims of the '235 patent so as to improve the resolution of narrow line widths.

Arnold teaches dyes to be used for antireflection are those that absorb in the wavelength region of the imaging source (see col. 4, lines 26-28), and Jain teaches that the dye added to the bottom photoresist layer should absorb at the same wavelength as that used to image the top photoresist layer (see col. 3, lines 14-20). Thus, when using a chemically-amplified positive photoresist, the dye or absorptive material used in the

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antireflective layer should be one that absorbs in the deep UV, e.g., around 250 nm as taught by Lamola at page 53; 200-300 nm as taught by McKean at page 619; and 240-265 nm as taught by Nalamasu at page 32. Deep UV absorptive materials are well known. Silverstein shows that compounds such as anthracene, naphthalene, phenanthrene and naphthacene absorb strongly at deep UV wavelengths (see Table XXI on page 252 and Figure 7 on page 253). Accordingly, the anthracene material recited in the antireflective composition of the claim 6 of the '235 patent would absorb deep UV.

15. Claims 1-4, 6-15 and 17-24 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-13 of U.S. Patent No. 7,014,982 (the '982 patent) in view of Jain Arnold, Lamola, McKean, Nalamasu, Willson and Silverstein.

The claims of the '982 patent teach the limitations of instant claims 1-4, 6-15 and 17-24, the differences being that the claims of the '982 patent do not specifically require that its layer comprising a crosslinked melamine material further comprises a silicon-containing material and is antireflective.

Jain teaches adding an adhesion promoter, such as β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, p-methyl-disilanemethyl methacrylate, vinyltrichlorosilane, or γ -amino-propyl triethoxysilane, to its bottom photosensitive layer (bottom photoresist layer) that includes binder, crosslinker and dye, wherein the layer also functions as an antireflective layer (see col. 3, lines col. 4, line 29 through col. 5, line 9; col. 16, line 49

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through col. 17, line 64; and col. 18, lines 35). Jain's crosslinker can be a melamine material (see col. 16, lines 49-67). Of course, the adhesion promoter would promote adhesion between the antireflective layer and the substrate, e.g., a silicon wafer, beneath it (see also col. 21, line 32). It is the Examiner's position that the adhesion promoter covalently bonds at one of its ends to Jain's resin and at its other end to the substrate. For example, with β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, the epoxy would bond to Jain's paravinylphenol or polyvinylphenol resin, whereas the silane would bond to a silicon or silicon dioxide surface. Thus, since the adhesion promoter is covalently attached to the resin and contains silicon, the resin of Jain's first photosensitive layer is a silicon-containing resin.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included an adhesion promoter, such as the β -(3,4-epoxy-cyclohexyl)-ethyltrimethoxysilane, p-methyl-disilanemethyl methacrylate, vinyltrichlorosilane, or γ -amino-propyl triethoxysilane taught by Jain, in the crosslinked melamine layer of the claims of the '982 patent so as to improve adhesion between the crosslinked resin and the substrate in the claims of the '982 patent.

With respect to antireflective properties of the crosslinked melamine layer in the claims of the '982 patent, it is noted that layer can further contain anthracene (claim 4), and that the photoresist on the layer is a chemically-amplified positive photoresist (claim 1). Arnold teaches dyes to be used for antireflection are those that absorb in the wavelength region of the imaging source (see col. 4, lines 26-28), and Jain teaches that the dye added to the bottom photoresist layer should absorb at the same wavelength as

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that used to image the top photoresist layer (see col. 3, lines 14-20). Thus, when using a chemically-amplified positive photoresist, the dye or absorptive material used in the antireflection layer beneath the photoresist is one that absorbs in the deep UV, e.g., around 250 nm as taught by Lamola at page 53; 200-300 nm as taught by McKean at page 619; and 240-265 nm as taught by Nalamasu at page 32. Deep UV absorptive materials are well known. Silverstein shows that compounds such as anthracene, naphthalene, phenanthrene and naphthacene absorb strongly at deep UV wavelengths (see Table XXI on page 252 and Figure 7 on page 253). Accordingly, since anthracene is present in the crosslinked melamine layer of the claims of the '982 patent, the layer can perform as an antireflective layer for the chemically-amplified positive photoresist.

16. Claims 1-4, 6-15 and 17-24 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 36-73 of copending Application No. 11/328,928 (the '928 application).

Claims 36-73 of the '928 application teach all of the limitations of the instant claims, the difference being that the claims of said application do not specifically call its coating composition layer an antireflective layer. However, it is the Examiner's position that said coating composition layer would function as an antireflective layer, particularly in view of the fact that it can contain an anthracene material.

This is a provisional obviousness-type double patenting rejection.

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Confirmable Subject Matter

17. Claims 5 and 16 are confirmed.

18. The following is a statement of reasons for the indication of confirmable subject matter: The prior art of record does not teach or suggest the instant coated substrate or method of forming a relief image on a substrate wherein the antireflective composition comprises a poly(vinylsilsesquioxane). Rhode et al (U.S. Patent 4,935,320, hereinafter "Rhode") teaches poly(vinylsilsesquioxane) can be used as the adhesive in its negative-working adhesive (col. 4, lines 8-14; col. 11, lines 9-22; col. 14, lines 65-68; and in particular, Preparation Example 9 at col. 35), which is in turn beneath a self-supporting photo-crosslinkable polyimide resist film (see abstract; col. 1, lines 7-15; col. 4, lines 8-14; col. 11, lines 9-22; and col. 14, lines 65-68). However, such a negative-working adhesive beneath a photo-crosslinkable polyimide film (photoresist) does not lead a skilled artisan to the use of a chemically-amplified positive photoresist. Indeed, none of the chemically amplified positive photoresists taught by Arnold, Lamola, McKean, Nalamasu, Willson uses a polyimide.

Allman et al (U.S. Patent 5,100,503), which is of record in the '864 patent, discloses polyorganosiloxanes such as polysilsesquioxanes for use in its antireflective layer for photolithography (see col. 1, lines 13-18; col. 2, line 64 through col. 3, line 24; and col. 5, lines 7-12). Vinyl is never mentioned as an organo group for the polymer, and the preferred and exemplified organo groups are methyl and phenyl for the preparation of polymethylphenylsilsesquioxane (see col. 5, lines 5-6; and col. 7, lines 49). Further, Allman teaches that organic dyes are "not preferred" due to the fact that

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spin-on-glass is used in its antireflective layer, and organic dyes do not remain stable at the 350-500°C spin-on-glass processing temperatures (see col. 2, lines 52-63). This is significant since the inorganic dyes disclosed by Allman, such as titanium dioxide, CrO_2 , etc, would not, pre se, be considered the best candidates for deep UV absorption needed for antireflection when using a chemically-amplified positive photoresist.

Conclusion

19. In order to ensure full consideration of any amendments, affidavits or declarations, or other documents as evidence of patentability, such documents must be submitted in response to this Office action. Submissions after the next Office action, which is intended to be a final action, will be governed by the requirements of 37 CFR 1.116, after final rejection and 37 CFR 41.33 after appeal, which will be strictly enforced.

Duty to Disclose

20. The patent owner is reminded of the continuing responsibility under 37 CFR 1.565(a) to apprise the Office of any litigation activity, or other prior or concurrent proceeding, involving Patent No. 6,773,864 throughout the course of this reexamination proceeding. The third party requester is also reminded of the ability to similarly apprise the Office of any such activity or proceeding throughout the course of this reexamination proceeding. See MPEP §§ 2207, 2282 and 2286.

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Correspondence

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is (571) 272-1338. The examiner can normally be reached on Monday through Friday from 5:30 a.m. to 2:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on (571) 272-1535.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Notice Re Patent Owner's Correspondence Address

Effective May 16, 2007, 37 CFR 1.33(c) has been revised to provide that:

The patent owner's correspondence address for all communications in an *ex parte* reexamination or an *inter partes* reexamination is designated as the correspondence address of the patent.

Revisions and Technical Corrections Affecting Requirements for Ex Parte and Inter Partes Reexamination, 72 FR 18892 (April 16, 2007)(Final Rule)

The correspondence address for any pending reexamination proceeding not having the same correspondence address as that of the patent is, by way of this

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revision to 37 CFR 1.33(c), automatically changed to that of the patent file as of the effective date.

This change is effective for any reexamination proceeding which is pending before the Office as of May 16, 2007, including the present reexamination proceeding, and to any reexamination proceeding which is filed after that date.

Parties are to take this change into account when filing papers, and direct communications accordingly.

In the event the patent owner's correspondence address listed in the papers (record) for the present proceeding is different from the correspondence address of the patent, it is strongly encouraged that the patent owner affirmatively file a Notification of Change of Correspondence Address in the reexamination proceeding and/or the patent (depending on which address patent owner desires), to conform the address of the proceeding with that of the patent and to clarify the record as to which address should be used for correspondence.

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Application/Control Number: 90/008,360

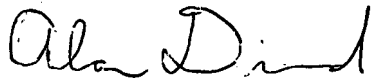
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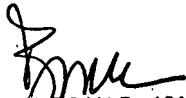
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Signed:



Alan Diamond
Primary Examiner
Central Reexamination Unit
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CENTRAL REEXAMINATION UNIT



STEPHEN J. STEIN
CRU EXAMINER - AU 3991

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SHEET 1 OF 1

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTY DOCKET NO.	U.S. PATENT NO. 6,773,864 B2
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (USE SEVERAL SHEETS IF NECESSARY)	APPLICANT Thackeray	EXAMINER To be assigned <i>Diamond</i>
	FILING DATE 12/31/02	GROUP ART UNIT To be assigned <i>3911</i>

U.S. PATENT DOCUMENTS							
EXAMINER INITIAL	Designation	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE (IF APPROPRIATE)
/AD/ ↓ V	Arnold	4,910,122	03/20/90	Arnold et al.	—	—	06/08/84
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EXAMINER INITIAL	OTHER DOCUMENTS (INCLUDING AUTHOR, TITLE, DATE, PERTINENT PAGES, ETC.)	
/AD/ ↓ V	Brewer	Brewer, T., et al., "The Reduction of the Standing Wave Effect in Positive Photoresists," <i>Jour. Appl. Photogr. Eng.</i> , Vol. 7, no. 6, pp. 184-186 (Dec. 1981).
	Crivello	Crivello et al., <i>J. Polym. Sci.: Polym. Chem.</i> 21 (1983) 97-109.
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	Lin	Y.-C. Lin, et al., "Some Aspects of Anti-Reflective Coating for Optical Lithography," <i>Advances Resist Tech., Proc.</i> , SPIE vol. 469, pp. 30-37 (1984).
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/AD/ ↓ V	Willson	Willson, C. G., "Organic Resist Materials - Theory and Chemistry", <i>Introduction to Microlithography</i> , American Chemical Society, 87-159 (1983).
	Claim Chart	Claim Chart

EXAMINER /Alan Diamond/	DATE CONSIDERED 03/14/2007
*EXAMINER: INITIAL IF CITATION CONSIDERED, WHETHER OR NOT CITATION IS IN CONFORMANCE WITH MPEP 609: DRAW LINE THROUGH CITATION IF NOT IN CONFORMANCE AND NOT CONSIDERED, INCLUDE COPY OF THIS FORM WITH NEXT COMMUNICATION TO APPLICANT.	

Notice of References CitedApplication/Control No.
90/008,360Applicant(s)/Patent Under
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6773864Examiner
Alan DiamondArt Unit
3991

Page 1 of 1

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*	B	US-5,126,289	06-1992	Ziger, David H.	438/671
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*	D	US-5,851,738	12-1998	Thackeray et al.	430/325
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	K	US-			
	L	US-			
	M	US-			

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
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	S					
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NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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